

1. A liquid crystal display having reduced common electrode resistance comprising:

two polarizers;

upper and lower substrates, each having upper and lower surfaces, between said polarizers;

an array of sub-pixel-sized color filters, separated one from another by a separation area, on the upper surface of said lower substrate;

an overcoat layer over said array of color filters and said upper surface of said lower substrate;

a layer of transparent, electrically conductive, material on said overcoat layer;

a black matrix on said layer of transparent, electrically conductive material;

means, on the lower surface of said upper substrate, for applying an electric field normal to any one of said color filters; and

a layer of liquid crystal between said upper and lower substrates.

2. The structure of claim 1 wherein said black matrix comprises a layer of material taken from the group consisting of chromium, titanium, molybdenum, nickel, tantalum, tungsten, and aluminum, patterned and etched so as to leave said color filters

ERS084-51

essentially uncovered and said separation area covered.

3. The structure of claim 1 wherein each color filter filters red, green, or blue light.

4. The structure of claim 1 wherein said layer of transparent, electrically conductive, material comprises indium tin oxide or indium oxide or tin oxide.

5. The structure of claim 1 wherein said overcoat layer comprises transparent polyimide or polymer or silicon oxide or silicon nitride.

10 6. The structure of claim 1 without said overcoat layer.

SUB B27 A liquid crystal display having reduced common electrode resistance comprising:

two polarizers;

15 upper and lower substrates, each having upper and lower surfaces, between said polarizers;

an array of sub-pixel-sized color filters, separated one from another by a separation area, on the upper surface of said lower substrate;

20 an overcoat layer over said array of color filters and said upper surface of said lower substrate;

a black matrix on said overcoat layer;

a layer of transparent, electrically conductive, material on said overcoat layer and said black matrix;

means, on the lower surface of said upper substrate, for
5 applying an electric field normal to any one of said color filters; and

a layer of liquid crystal confined between said upper and lower substrates.

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8. The structure of claim 7 wherein said black matrix comprises
10 a layer of material taken from the group consisting of chromium, titanium, molybdenum, nickel, tantalum, tungsten, and aluminum, patterned and etched so as to leave said color filters essentially uncovered and said separation area covered.

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9. The structure of claim 7 wherein each color filter filters
15 red, green, or blue light.

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10. The structure of claim 7 wherein said layer of transparent, electrically conductive, material comprises indium tin oxide or indium oxide or tin oxide.

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11. The structure of claim 7 wherein said overcoat layer
20 comprises transparent polyimide or silicon oxide or silicon ΔC

nitride.

12. The structure of claim 7 without said overcoat layer.

13. A method for making a black matrix in a liquid crystal display comprising:

5 (a) providing a transparent insulating substrate having an upper surface;

(b) coating said upper surface with a layer of a photosensitive resin in which a colored pigment has been dispersed;

10 (c) selectively exposing pixel-sized regions of said photosensitive resin, there being a separation area between said regions, to ultraviolet light and then removing all unexposed regions of said resin layer;

15 (d) coating said upper surface, including any exposed resin, with a layer of photosensitive resin in which has been dispersed a pigment of a color different from any already present on said upper surface, and then repeating step (c);

(e) repeating step (d) one or more times;

(f) depositing an overcoat layer;

20 (g) depositing a transparent, electrically conductive, layer;

(h) depositing a layer of chromium; and

(i) selectively etching said layer of chromium so as to

ERS084-51

leave said pixel-sized regions uncovered and said separation area covered.

14. The method of claim 13 wherein red, green, and blue pigments are used.

5 15. The method of claim 13 wherein said layer of transparent, electrically conductive, material comprises indium tin oxide deposited to a thickness between about 500 and about 3,000 Angstroms.

10 16. The method of claim 13 wherein said overcoat layer comprises transparent polyimide or polymer deposited to a thickness between 0 and about 2 microns.

17. The method of claim 13 wherein said layer of photosensitive resin is applied by means of spin coating.

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B3 18. A method for making a black matrix in a liquid crystal display comprising:

(a) providing a transparent insulating substrate having an upper surface;

20 (b) coating said upper surface with a layer of a photosensitive resin in which a colored pigment has been dispersed;

(c) selectively exposing sub-pixel-sized regions of said photosensitive resin, there being a separation area between said regions, to ultraviolet light and then removing all unexposed regions of said resin layer;

5 (d) coating said upper surface, including any exposed resin, with a layer of photosensitive resin in which has been dispersed a pigment of a color different from any already present on said upper surface, and then repeating step (c);

(e) repeating step (d) one or more times;

10 (f) depositing an overcoat layer;

(g) depositing a layer of chromium;

(h) selectively etching said layer of chromium so as to leave said pixel-sized regions uncovered and said separation area covered; and

15 (i) depositing a transparent, electrically conductive, layer.

7 19. The method of claim ⁶18 wherein red, green, and blue pigments are used.

Sub B4 20. The method of claim 18 wherein said layer of transparent, 20 electrically conductive, material comprises indium tin oxide deposited to a thickness between about 500 and about 3,000 Angstroms.

ERS084-51

9^a 21. The method of claim ⁶18 wherein said overcoat layer comprises transparent polyimide or polymer deposited to a thickness between 0 and about 2 microns.

10¹⁰ 22. The method of claim ⁶18 wherein said layer of photosensitive
5 resin is applied by means of spin coating.